

ROYAL BOTANIC GARDENS, KEW.

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XVII.—ON THE SELECTION OF HEVEA
BRASILIENSIS.

In the *Kew Bulletin*, 1919, p. 317, a review was published of the paper by Mr. Stafford Whitby on "Variation in *Hevea brasiliensis*." The results of the investigations detailed in this paper cannot fail to be of considerable value in any attempts which may be made to improve the types of *Hevea* grown by means of seed selection. The following account dealing with the selection of *Hevea brasiliensis* in the Dutch East Indies has been very kindly prepared by Mrs. F. R. Durham from the paper written in Dutch by Dr. C. Heusser, the botanist on the staff of the Rubber Planters' Association, East Coast of Sumatra at Medan, Sumatra, the General Experiment Station of the A.V.R.O.S. (Algemeene Vereeniging van Rubberplanters ter Oostkust van Sumatra). Dr. J. G. J. A. Maas, Agricultural Assistant at the same station, has also published a paper on the Vegetative Propagation of *Hevea* in 'Archief voor de Rubbercultuur' iii. no. 7, a translation of which is given in the *Tropical Agriculturist*, vol. liv. no. 1, 1920, p. 2. In this paper the various methods of budding, grafting and striking by means of cuttings are described in some detail.

Dr. Heusser's paper is reprinted from the 'Archief voor de Rubbercultuur,' vol. iii. part 1, of July 1st, 1919, and is issued as a Report from the General Experiment Station of the A.V.R.O.S. Rubber Series, no. 21.

In the year 1914 Dr. Cramer drew attention to the necessity of selecting *Hevea*, and urged that further introductions of fresh material should be made from the Amazonian region,* basing his suggestions on the experience gained in the cultivation of *Cinchona*.

* Rubber Recueil. Internat. Rubber Congres. Batavia, 1914, p. 13, and Official Report, p. 23.

Bauer* in the same year explained the scientific principles on which the selection of *Hevea* should be based. He also advocated the introduction of fresh types from Brazil, in addition to selection from among the *Hevea* plants cultivated in the East Indies. There are thus two points of view under consideration:—

1. Selection from the trees at present in the East Indies.
2. Importation of new types from Brazil.

The first method would mean the improvement of the existing plantation *Hevea*, for a better stock of plants would be raised by the selection and cultivation of a healthy and high-yielding strain of plants.

The prospects of selecting a good strain from local trees are encouraging. The variation in yield of latex between good and bad yielders is very great, and the latter predominate. From the statistics it appears that the greater part of the total yield of a plantation comes from the good trees which are in a minority. A striking example of individual variation in yield is afforded by one of the selected trees, compared with its neighbours. The plantation is 14 years old. In 1917 the selected tree gave on an average 85 grammes of latex per day, and in 1918 the yield was 70 grammes. (Average of 12 monthly observations.) This tree had been conspicuous even earlier by its high rate of yield. The highest daily yield in those two years was 150 grammes, the lowest 42 grammes. Other trees of this same plantation yielded on an average 8 grammes per day, while many only gave 3–4 grammes, though grown under the same conditions as the selected tree and apparently equally as well developed.

The yield of this tree is about ten times as great as that of an average tree in a good modern plantation, and it appears to be due entirely to some individual peculiarity of the tree. Trees yielding 30 grammes per day may be seen on some ten-year old plantations (*i.e.*, four times the average daily yield). Thus, as Stafford Whitby showed, there exists among plantation *Hevea* trees good material for selection offering every chance of success.

Two methods of selection may be adopted:—

1. *Generative Selection.* Pure strains of high-yielders may be gradually raised from the mixture of good and bad trees by crossing high-yielders during many generations.

2. *Vegetative Selection.* The good qualities of high-yielders may be perpetuated by grafting and by means of cuttings.

Generative Selection.—Seed selection is on the whole the better method; but it is essential that both the parents should be high latex-yielders. The crossing of good-yielders can be carried out by hand, or seed nurseries may be formed in isolated localities. Bauer recommends nurseries composed of trees grafted from good parent trees of both sexes.

A good method of forming seed nurseries is by grafting high-yielders on strong year-old stems. Stocks grafted with two

* Die Fortschritte der Vererbungsforschung und ihre Bedeutung für die Züchtung tropischer Kulturpflanzen besonders der Kautschukpflanzen. Official report of the Internat. Rubber Congres. Batavia, 1914, appendix 3, p. xxx.

different high-yielders should be planted as far away as possible from other Heveas. The nursery would then consist of two physiological individuals, and natural cross-fertilisation should result. A plantation of grafted trees from more than two female parents is not to be recommended—it becomes impossible to check the origin of the second generation, and the question of selection is unduly complicated.

The seed from these nurseries will furnish a small percentage of descendants as good as, or possibly even better than, either parent. The best trees raised are then planted out in fresh nurseries. In each succeeding generation the quality of the seed will improve.

A plan of the nursery is given by Dr. Heusser, showing the trees grafted from the two individuals in unequal numbers; so that should self-fertilisation occur, the fewer trees of one individual can be cut out without disadvantage. The plants are spaced 9 m. by 9 m. apart.

Artificial crossing of good-yielders may be carried out in the plantation, if an isolated nursery cannot be made, and there is the further advantage that the first nursery generation would thus be avoided. In practice, however, it is laborious. In order to reach the flowers of the female parent the erection of light scaffolding is generally necessary. Before the opening of the female flowers, the inflorescences must be enclosed in a gauze balloon. The flowers always open about 1 o'clock, and those that have not opened by 4 p.m. will not expand until the next afternoon. In order to shorten the time of the unnatural confinement in the balloon, the latter is only applied late in the forenoon and fertilisation is begun at 3 p.m. Female flowers that open before the balloon is applied must be pinched off. Fertilisation is effected by breaking off a stamen from the male blossom with a pair of forceps and applying the pollen to the stigma. This operation should be repeated once or twice with fresh stamens, to ensure that ripe pollen is applied to the stigma. Pollen may be taken from male flowers in bud as the anthers dehisce before the flower opens. After fertilisation the orifice of the flower is closed with a small plug of kapok, to exclude further pollen. The bristles of the corolla and a small quantity of escaped latex hold the plug in place. The plug is cast off with the corolla when the flower dies, and does not hinder the development of the fruit.

Any remaining flower buds must then be pinched off and the twig marked with a zinc label. The fruits must be picked singly before bursting to prevent confusion, and to make certain that they are the product of one particular tree (see in this connection K. B., 1919, p. 318).

The main objection to selection by seed is the long waiting period before a highly productive strain can be established. Before a young *Hevea* reaches seed-bearing age some 3–5 years must elapse, and even then a tree cannot be relied on with any certainty.

A second factor that may handicap the work of seed selection is the manner in which characters are inherited. It appears that high latex production is the result of several factors, and that if

a good-yielder is to be produced there must be a favourable combination of the necessary hereditary characters. The relative scarcity of high-yielders (1-2 per cent.), and possibly the very gradual range from these to non-yielders, lends support to this view.

When once the stock has become more homogeneous, favourable combinations will be more easily obtained, the isolation of any particular character could then be brought about by self-fertilisation.

There is yet a third difficulty, since *Hevea* is fertilised by insects and appears to be practically self-sterile. Petch records a tree which stood entirely isolated and had never been known to bear fruit. A similar case, though not absolutely reliable, is known from the east coast of Sumatra. Cramer reported in 1914 that artificial self-fertilisation, as described above, applied to over 300 flowers of one tree failed completely. The fruit-setting was likewise poor (7 per cent.), after artificial fertilisation with pollen from other trees. This may be comparable to the facts well-known to fruit growers, that some trees, though they flower profusely set no fruit, while others are highly fertile.

In the case of one of these fertile trees, four out of 95 self-fertilised flowers set their fruit, whilst of 78 cross-fertilised flowers 19 set fruit. Self-fertilisation, therefore, is possible in fertile trees as Mr. J. G. J. A. Maas demonstrated in 1917. Further trials will, however, be needed to prove that enough seed can be obtained by this method for selection on a large scale, and also to ascertain whether the descendants remain constant. In practice, fertilisation with foreign pollen must be undertaken, and nurseries must be so arranged that with favourable results one of the two individual trees can be removed.

Propagation by seed is thus a lengthy process, but it must not be neglected, and should, if possible, be undertaken in experiment stations.

1. Nurseries should be established with trees grafted from two female parent trees, and natural cross-fertilisation should be relied upon.

2. Artificial cross-fertilisation (eventually self-fertilisation) of good-yielders should be carried out where it is not possible to form isolated nurseries.

The same rules which apply to the selection of the character of high latex production may be followed for any other advantageous qualities, such as resistance to disease, thickness of bark, etc., in so far as these may be hereditary.

Vegetative selection.—A rapid improvement in the strain of *Hevea* as regards latex yield may be obtained by vegetative methods of propagation.

The stock of a high-yielder may be multiplied by grafting or budding on less valuable stock. Technically it is very easily done; there are several good methods, especially Forkert grafting.*

The value of such grafted plants, having a poor-yielder for their root-stock and a good-yielder for their crowns, must be tested

* Van Helten: The Grafting of *Hevea*, Archives for Rubber culture No. 1, 2nd Vol. 1918, p. 637.

by trial tappings. The results are said to be excellent where the latex is formed in the stem and crown; and also to be good where the latex is formed all over the tree;* but *nil* when it is formed in the root-stock. The observation that the latex vessels are relatively more numerous and larger in the tissues of the root than in the stem and branches leads to the conclusion that the roots act as reservoirs for the latex, and similar conclusions were come to by Arisz as the result of his experiments.

Propagation by cuttings (Ringing or Marcottage). This is the safer and more rapid method of obtaining a stock of plants from a good-yielding tree.

Two objections are often raised against propagation by cuttings:—

1. The difficulty of obtaining good stock for cuttings.
2. The bad root development which it is alleged is found in cuttings, and often results in the loss of the tap root.

While the difficulty about the roots is inconsiderable, the first point is a more serious one.

This obstacle may be overcome by the establishment of nurseries for providing cuttings in which strong year-old trees may be grafted with scions from the best yielder in the plantation. A ten-year old tree would easily furnish 200–500 grafts.

The shoots from these grafts, as soon as they have the thickness of a finger, are suitable for cuttings. The secondary buds of the grafts should be allowed to shoot, so that the tree may become shrubby and so furnish a succession of material for cuttings.

The striking of the cuttings may be done in the native manner known as “Marcottage.” A ring of bark 2 cm. wide is removed, and the cambium is scraped off from the area so ringed; the ringed portion is then wrapped up after being covered with earth and fibre.

This method is easier to check and simpler to carry out, if a small bamboo basket without a bottom is placed round the ringed space and filled with clean fine sand and, if necessary, watered daily. If the ring is made more than 50 cm. from the ground an easily removable basket can readily be devised.

According to the experience of planters the best place for ringing a branch is just below a bud, as roots are more readily produced at such a spot.

Dr. Heusser considers the objections about the roots of the cuttings to be largely prejudice, and he figures a very well rooted eight-weeks' old cutting. The three chief roots produced by this cutting could no doubt develop into good tap roots, just as in any plant where the primary tap root is broken off secondary roots will take its place. Tap roots always form where they are needed, and where the water-level permits it. On low-lying plantations there are always more trees without than with tap roots. The significance of the tap root for the plant diminishes with its age, and with the strengthening of the side roots. It is true that the stability of a tree, especially of a young tree, is greatly decreased by the breaking off of the tap root, but in the case of rubber each

* See Bobiloff, Archives for Rubber Culture, March, 1919.

† Archives for Rubber Culture, July, 1918.

tree is of so much value that it is advisable to give the young trees some support.

The cuttings should be severed as soon as the first two or three roots have reached a length of 3 cm., which may take place in some five or six weeks. After removal of the cuttings the cut surfaces must be covered with tar or paraffin, and the cuttings planted out either as bare stumps or with the majority of the leaves removed. It has been found that root growth is stimulated by watering with dilute lime water.

Dr. Heusser goes on to say that this method of selection is limited by the physiological "life" of the original tree. For the life period cannot be lengthened by grafting or by taking cuttings. However young a cutting may be, and however young may be the stock on which the graft is made, as soon as the parent tree reaches the end of its natural "life," all its descendants will die as well. He adds that we have no certain information as to the physiological life of *Hevea*, but that it is to be feared it is not a very long one.*

The Choice of Trees to be used for Selection.—1. *A high and constant yield of latex* is the chief desideratum in a tree to be used for selection purposes. On the figures of the daily yield of latex taken for several months, and, if possible, on days when an abnormally high or low yield is not anticipated (not on rainy days), the first selection may be based. Further, the quality of the tree is judged by—

2. *State of Health.* Trees giving abnormally high yields from disease must be neglected, or only considered after recovery. Gnarled or twisted trees should not be used.

3. *Good Hereditary Qualities.* It must be remembered that high latex yield depends not only on good inherited qualities, but also on such other factors, as soil, age, size, and the competition it may have with neighbouring trees. The yield must be judged in relation with that given by the trees growing under the same conditions.

The second point in the programme of selection, the introduction of new types of *Hevea* from South America, may be of great importance in the future. We know that our cultivated East India *Hevea* comes from the Tapajoz region on the right bank of the lower Amazon. A better variety of *Hevea brasiliensis* is said to exist near the upper course of the Rio Purus and Rio Madeira.† Besides, more than 20 species of *Hevea* have been described, the value of which for cultivation is but imperfectly known. *Hevea brasiliensis* is justly regarded as the best of its kind. Our high producers, to use Dr. Cramer's expression, are veritable "Ledgerianas" (in Quinine culture *C. Ledgeriana* is the highest producer).

It must, however, be remembered that there may be species of

* Whether Dr. Heusser's statement has any foundation in fact remains to be proved. The only plant in which something of the kind is known to occur is the Bamboo, but many cases are known in which trees grafted from some particular 'sport' or seedling variety still exist in a healthy and active state of growth though the original tree has long since died.—Ed.

† Tapajoz rubber, Acre rubber. See Cramer Rubber Recueil, 1914.

Hevea as yet untried, any of which may also have its "Ledgerianas." Besides, it is worth while to find out whether other advantageous qualities, such as qualities of the rubber, geographical adaptability, etc., are present in the sorts which might give good results either by themselves or by crossing.

The establishment of a standard garden, containing every type of the genus *Hevea*, would place inexhaustible material at the disposal of the plant breeder, and steps in this direction have been taken by Dr. Cramer in the establishment of the selection station at Buitenzorg.

XVIII.—GARDEN NOTES ON NEW OR RARE TREES AND SHRUBS.

W. J. BEAN.

Cladrastis Wilsonii, Takeda [Leguminosae.]

Two of the most interesting trees introduced by Mr. Wilson from China are two species of *Cladrastis*, viz., *C. sinensis* Hemsley (see *Kew Bulletin*, 1913, p. 164) and *C. Wilsonii*. Both belong to the true *Cladrastis*—as distinct from *Maackia*, which by Bentham and Hooker was united with it. Previous to the comparatively recent discovery of these two species and another Japanese one, *Cladrastis* was only known by a single species found in the Eastern United States, the well-known "Yellow wood," *C. tinctoria*. *C. Wilsonii* is fairly common in the moist woods of Western Hupeh, but rare in Kiangsi. Farther west it is replaced by *C. sinensis*. In cultivation *C. Wilsonii* is extremely rare, and we have but one plant at Kew; this was obtained from the Arnold Arboretum in 1910. It is possible that it may be in cultivation elsewhere under Wilson's number 1102.

C. Wilsonii is a tree 15 to 50 ft. high, the trunk up to $1\frac{1}{2}$ ft. in diameter. Its leaves are deciduous, 9 to 13 in. long, pinnate, with nine to fifteen leaflets on each leaf. Leaflets ovate to elliptic, $1\frac{1}{2}$ to 3 in. long, $\frac{1}{2}$ to $1\frac{1}{4}$ in. wide, the terminal one the largest. (On the wild specimens collected in China and preserved in the Kew Herbarium the leaflets are fewer on each leaf but individually larger, often 4 in. long and 2 to $2\frac{1}{2}$ in. wide.) They are dark green above, sub-glaucous beneath, and at maturity glabrous except on the short stalk. The flowers (not yet seen in cultivation) are white, about 1 in. long and borne on lax, terminal, many-flowered panicles 12 to 16 in. long. From *C. sinensis*, this species is distinguished by its densely pubescent ovary, large flowers, and broader leaves. Both have the axillary leaf-buds hidden and enclosed by the swollen base of the leaf stalk, a character which gives a ready distinction between the true *Cladrastis* and *Maackia*.

New Magnolias.

Magnolia conspicua var. *purpurascens*, Maximowicz; (*M. denudata* var. *purpurascens*, Rehd. et Wils.) [Magnoliaceae].

Amongst the numerous trees and shrubs introduced to this

country from China by Mr. Wilson, there are few which will attract plant-lovers more than his new Magnolias. In the size of their individual flowers Magnolias surpass all other trees or shrubs that we can grow in the open air, and it may be safely said of them all, even the least attractive, that they are well worth growing.

For more than a hundred years, the yulan, or lily-tree, *M. conspicua*, has been one of the most valued of our hardy trees, and a new form of it is sure to be greatly welcomed. First named and described by Maximowicz in 1872, it was not until about 1900 that Mr. Wilson obtained seeds of the var. *purpurascens*. From them were raised plants in the Coombe Wood Nursery which are now well established in cultivation at Kew and elsewhere. The "Wilson-Veitch" number is 688. It is evidently a big tree in Western Hupeh, for Mr. Wilson found it as much as 65 ft. high with a trunk $6\frac{1}{2}$ ft. in girth. In the shape and leathery texture of the adult leaves it is very similar to the ordinary *M. conspicua*. They are mostly obovate, much the broadest towards the apex, where is a conspicuous mucro, and pubescent on and near the midrib and chief nerves beneath. The flower is erect, very shortly-stalked, and at first clasped at the base with large, very hairy bracts. Mr. Wilson says the flowers, as seen by him in China, vary in colour from rosy red without to rose or pale pink within. On April 12th, 1919, I was fortunate to see this Magnolia in flower in the grounds of Caerhays Castle. There it was of a beautiful soft but glowing pink, distinct in shade from any other Magnolia I had seen, but approaching *M. Campbellii* probably more than any other.

Magnolia Dawsoniana, Rehder et Wilson.

There is very little to be said of this species at present, but as two grafted plants under the name have recently been received at Kew from Messrs. Chenault of Orleans, who had obtained it from the Arnold Arboretum, it may be worth while to put its introduction on record. Mr. E. H. Wilson discovered it in 1908 in Western Szechuen, near Tachien-lu, at altitudes of 6500 ft. to 7500 ft. There is, therefore, a good prospect of its being hardy in this country. It is a tree from 25 to 40 ft. high, glabrous in leaf and twig. The leaves are of firm, leathery texture, obovate or elliptic, $3\frac{1}{2}$ in. to 6 in. long and about half as much wide, shining green above, the leafstalk $\frac{1}{2}$ to $1\frac{1}{4}$ in. long. The flowers are unknown, but the fruit is cylindrical, 4 in. long by $1\frac{1}{2}$ in. wide, with orange-scarlet coated seeds.

This Magnolia is rare, and at present is only known from the remote locality where Mr. Wilson collected it in 1908 and again in 1910. He and Mr. Rehder suggest that it is most closely allied to *M. conspicua* (*M. denudata*, Desrousseaux). Another species with the qualities of that wonderful tree would be a great acquisition.

Magnolia Nicholsoniana, Rehder et Wilson.

Along with the preceding species, Kew is indebted for this new and very rare Magnolia to Messrs. Chenault of Orleans. It was

discovered by Mr. Wilson in Western Szechuen at altitudes of 7500 to over 9000 ft. It ought then to be perfectly hardy with us. It is a deciduous shrub or tree from 12' to 20 ft. high, the slender young shoots at first clothed with brown hairs, becoming purplish and glabrous the second year. The leaves are elliptic-oblong or slightly obovate, 3 to 5 in. long, $1\frac{1}{2}$ to 2 in. wide, acute at the apex, broadly wedge-shaped to rounded at the base, glabrous and dull green above, slightly glaucous and at first sparsely hairy beneath, except on the midrib, which is densely clothed with brown hairs; the petiole is slender and $\frac{1}{2}$ to $1\frac{3}{4}$ in. long. The cup-shaped flower comes with the young growth and expands in June; it is white, fragrant, 3 to 4 in. wide, the petals obovate, broad or even rounded at the apex and 1 in. wide; stamens red. The fruit is cylindrical, 2 in. long, seeds scarlet-coated.

According to Mr. Wilson, *M. Nicholsoniana* is very rare in a wild state and is only known to occur in moist thickets and woodlands on and around Wa-shan. It belongs to the same group as *M. Wilsonii*, but differs from that species in its longer leaf-stalks and much less hairy leaves. It is named in honour of the late George Nicholson, Curator of Kew, 1885-1901.

Magnolia Sargentiana, Rehder et Wilson.

Judging by the statements made by Mr. Wilson, based on his observations of this tree as seen by him growing wild in Western Szechuen, it must be naturally one of the most magnificent of all Magnolias. He met with it frequently 50 to 65 ft. high, and one specimen he saw in 1903 near Wa-shan was over 80 ft. high with a trunk nearly 10 ft. in girth. Five years later, when he made a special journey to photograph this tree, he found, unhappily, that it had been cut down. The species appears to be most closely allied to the Himalayan *M. Campbellii*, whose splendid blossoms are fairly well known in the milder parts of the British Isles. The flowers have not yet been seen, or, at any rate, described, by any European, but Mr. Wilson was informed by the Chinese that they were rosy red to rosy pink and about 8 in. across. The leaves are deciduous, obovate, tapered towards the base, 4 to 7 in. long, $2\frac{1}{2}$ to 4 in. wide, smooth above, densely villose beneath. The fruit is apparently very handsome, being cylindrical, 4 to $5\frac{1}{2}$ in. long, pink, with scarlet-coated seeds.

M. Sargentiana was sent to Kew from the Arnold Arboretum in 1911, at the same time as *M. Wilsonii*, but it does not thrive so well. Probably, as its native altitudes are 1000 to 2000 ft. lower than those of *M. Wilsonii*, it may not be so hardy. It ought to be tried in the south-western counties, and is, indeed, succeeding very well at Caerhays. We find it can be propagated by cuttings of half-ripened leafy shoots.

Magnolia Wilsonii, Rehder.

In its general appearance, this *Magnolia* has a considerable resemblance to *M. parviflora*, and it promises to be equally as beautiful a shrub in gardens. It was discovered by Mr. Wilson in 1904, in Western Szechuen, south-east of Tachien-lu, at altitudes of 7000 to 8500 ft., but the plants in cultivation at Kew

were raised from seeds collected by him in the same region four years later. In a wild state it is usually a shrub up to 10 ft. high, but is occasionally seen as a small tree more than twice as high; the young wood is dark brown, clothed at first with pale brown hairs. The leaves are lanceolate to narrowly oval, slenderly pointed, rounded to broadly wedge-shaped at the base; 3 to 6 in. long, $1\frac{1}{2}$ to 3 in. wide, dull green and glabrous above, soft and velvety beneath, with a dense covering of pale brown, silky hairs; petiole $\frac{1}{2}$ to $1\frac{1}{2}$ in. long. The fragrant flower is borne at the end of the young leafy shoot and opens in late May and June. The petals are pure white and, being incurved, give a flower of cupped shape. Each flower is about 3 in. in diameter, and is made additionally attractive by the ring of bright red stamens in the centre. The flower stalk is 1 to $1\frac{1}{2}$ in. long, clothed densely with pale brown hairs and circled midway by a conspicuous scar left by a deciduous bract. Fruit, cylindrical-ovoid, 2 in. long by $\frac{3}{4}$ in. wide. The species is well distinguished from *M. parviflora* by the greater hairiness of the leaves, leafstalks and flowerstalks; the leaves, too, of *M. parviflora* are broader and less tapered at the apex, and the flowerstalk is nearly twice as long as in the present species.

M. Wilsonii flowered for the first time at Kew last June. It appears to be perfectly hardy here, but has grown much more rapidly and reached the flowering state sooner in Cornwall, Mr. P. D. Williams sent a flower to Kew in 1917 from his garden at Lanarth in that county, and I believe it had flowered there previously. The flower is pendulous, and this character, as Mr. Williams has observed, will be very attractive in specimens tall enough for the richly-coloured stamens to be seen from below.

***Quercus alnifolia*, Poech. [Cupuliferae.]**

Although introduced to Kew as long ago as 1885, this interesting oak still remains perhaps the rarest of the cultivated evergreen species. It is a small tree, often a shrub, and is found wild on the mountains of Cyprus up to 500 ft., usually as underwood in pine forests. It is evergreen, its leaves very stiff and leathery, obovate or nearly orbicular, entire or (in young trees especially) sharply toothed; on cultivated plants they are usually $1\frac{1}{2}$ to 2 in. wide, but on wild specimens up to 3 in. The upper surface is dark glossy green, but on the lower one the leaf is covered with a rich, tawny golden tomentum, a character which distinguishes this oak from all others in cultivation, and is only rivalled among hardy trees by the golden chestnut of California—*Castanopsis chrysophylla*. The golden colour is most beautiful whilst the leaf is young; with age it becomes yellowish-grey. The acorns are slender and somewhat truncheon-shaped, 1 to $1\frac{1}{2}$ in. long.

The best plant at Kew was, until recently, growing in the Temperate House, but it is quite hardy, and has been transplanted to the open air. It was originally raised at Kew from acorns sent by Sir Robert Biddulph, High Commissioner for Cyprus from 1879 to 1886. It is very desirable that the species should be re-introduced, and if this should meet the notice of any one in a position to obtain acorns, tree-lovers in this country would be

gratified if the opportunity were taken to send some home. The tree is apparently not uncommon in Cyprus, for Kotschy states that the acorns were collected by the monks of the Greek monasteries, dried, and used for mixing with the winter fodder of their domestic animals.

Quercus cleistocarpa, *Seemen*. (*Lithocarpus cleistocarpa*, Rehder and Wilson.)

In regard to size of individual leaf this is the finest of the oaks introduced from China. Acorns were sent home by Mr. E. H. Wilson in 1901, when he was collecting for Messrs. Veitch, and plants raised at Coombe Wood under his seed number 1204 are now in cultivation at Kew and elsewhere. It is evergreen and apparently quite hardy. But how much it appreciates a climate milder than the average one of this country is shown by a tree growing in Mr. J. C. Williams' woods at Caerhays, in Cornwall, as compared with plants at Kew. Here it is a shrub, slow-growing and with leaves up to 6 in. long only, whereas in Cornwall the tree has a slender erect stem and bears leaves well over 1 ft. long by 3 or 4 in. wide. All the leaves are perfectly glabrous, cuneate at the base, with an acuminate apex, and are rather greyish-green in hue. The acorn-cups are $\frac{3}{4}$ to 1 in. wide, densely clustered on a stiff spike 2 to 3 in. long, the acorns almost entirely enclosed. It may be long before they are produced in this country, but as a fine-foliaged tree it is well worth cultivation in the milder counties. Wilson found it in Western Hupeh as a tree 40 to upwards of 50 ft. high.

Rhododendron hippophaeoides, *Balfour fil. et W. W. Smith*. [Ericaceae.]

This charming *Rhododendron* is one of Mr. Forrest's discoveries. He found it as a shrub 4 to 5 ft. high in open situations in Alpine scrub on the mountains of Yunnan, China, at an altitude of 12,000 ft. From seeds presented by Mr. J. C. Williams in 1915, a good stock has been obtained at Kew. As represented by these young plants, the species is of erect, rather slender growth, the young branches furnished the whole of their length with leaves. The leaves are narrowly oblong or oblanceolate, 1 to $1\frac{1}{2}$ in. long and $\frac{1}{4}$ to $\frac{3}{8}$ in. wide, tapered at the base, rounded but with a small mucro at the apex; they are dull, dark green above, pale greyish-brown beneath, both surfaces covered with scales. The leaf, when crushed, has a slightly acrid odour. The flowers are borne, seven or eight together, in terminal clusters. The corolla, $\frac{3}{4}$ to 1 in. wide, with five rounded spreading lobes, varies considerably in colour. Mr. Forrest describes the flowers as "blue, drying a lavender blue," "pale bluish rose," and "deep purplish blue." On one plant at Kew they are pink. The calyx is pale green, scaly, distinctly five-lobed; ovary scaly; style glabrous; stamens with a ring of pubescence near the base; anthers brownish red.

The species is thriving well at Kew, and flowers both in autumn and in spring. This year, the mild weather of February and early March brought out the flowers earlier than usual, and the first

crop was caught by frost. It has produced flowers at Kew during six months of the year, viz., September, October, and from February to May.

Smilax megalantha, C. H. Wright. [Liliaceae.]

This species was originally described by Mr. Wright in the *Kew Bulletin*, 1895, p. 118, from material collected in Szechuen by Pratt, and on Mount Omei by Faber. Mr. E. H. Wilson found it in Western Hupeh in ravines north and south of Ichang in March and December, 1907. From seeds (No. 661) collected by him and sent to Kew the following year from the Arnold Arboretum, plants were raised which have grown very well and are now established in the Bamboo Garden. As a foliage plant it promises to be the finest of all the hardy smilaxes in cultivation. It is a climber growing 10 to 15 ft. high, evergreen, with leaves varying much in size and shape. The largest are as much as 9 in. long by 6 in. wide, broadly ovate, acute, rounded at the base, firm and leathery in texture, conspicuously three-nerved, dark green above and slightly glaucous beneath. The smaller leaves are narrowly oblong to lanceolate, $3\frac{1}{2}$ in. long by $1\frac{1}{4}$ in. wide. According to Wilson the flowers are greenish and the fruit coral red. It promises to make a valuable addition to our rather scanty evergreen climbers.

XIX.—SETARIA OR CHAETOCHLOA?

O. STAFF.

In the year 1897 F. Lamson Scribner (in U.S. Dept. Agr. Div. Agrost. Bull. iv. 38) proposed the name *Chaetochloa* for the genus of grasses generally known as *Setaria*. The reasons for doing so were stated to be that "the name *Setaria* . . . which has been taken up by many botanists for a number of well-known weedy grasses with dense, spike-like, bristly panicles, was first applied by Beauvois (in Oware and Benin) to a species of *Pennisetum*", and secondly that "at an earlier date the name was employed by Acharius to designate a genus of lichens." When working out the genus *Setaria* (*Gramineae*) for the Flora of Tropical Africa I had to decide which of the two names should be taken up, and for that purpose examine their history.

It is quite true that the name *Setaria* was used for the first time by Acharius on p. 219 of his *Lichenographiae Suecicae Prodomus* (1798). But he proposed it to designate a "TRIBUS" of the genus *Lichen* and not a distinct genus. At that date Acharius was still of opinion that the time for breaking up the Linnean genus *Lichen* into smaller genera had not yet come, as the organs of fructification on which a system of genera would have to be based were still unknown. "Sin exstierint hae fructificationis partes, haud tamen sufficientem earum habemus notitiam, sine qua, secundum jam rata atque confirmata fundamenta, diversa statuere genera nec licet, nec oportet (l.c. p. x.). Others, he says (p. vii.) may take his tribus for genera ("quavis si placet, et validior subest

ratio, totidem finget genera"), but he himself saw no reason (p. viii.) why he should not follow his revered teacher (Linnaeus) in admitting only one genus, *i.e.*, Lichen ("Me certe huc usque nec propria indagatio, nec aliorum demonstrationes impulere, quin deveniendi olim Praeceptoris mei sententiam, absque omni partium studio, velut rectissimam sequar.") I have quoted those passages because the fact that he actually makes binominal quotations combining the name of the "tribus" and the specific epithet and quotes the latter in the index under the "tribus" is apt to create the impression that he meant his "tribus" to be after all "genera." Possibly he wished to prepare for the not improbable eventuality of the recognition of Lichen genera, and in that case to have the necessary specific names ready. Pending that recognition he adhered to the Linnean system, not only enumerating and diagnosing the older species, but also describing his own new species of "Lichen." The combinations mentioned occur in each case after the diagnosis, heading the synonymy and in the case of Swedish species in the same line with the Swedish name, these names being his own invention (Nomina . . . suecana . . . passim a me ficta, p. vi.) and mere translations of the specific name, *e.g.* *Lichen deustus* . . . *Umbilicaria deusta*. Svet. Svedlaf (sveda = deure; laf = lichen).

It was, however, not long before Acharius admitted Genera in lichens. Five years later in his *Methodus* (p.v.) he confesses "Quod autem in specie ad Lichenum distributionem in plura Genera attinet, credo neminem vel tantillum in eorum historia versatum jam infitias iturum, eam aequae necessariam ac utilem esse" and "Sic etiam Lichenes, me quidem iudice, potius Familiam vel Ordinem Cryptogamiae Classis quam Genus solum constituere sat firmis argumentis probari potest." In this *Methodus* *Setaria* does not occur at all. Two of the three species of the "Tribus" *Setaria*, *Lichen jubatus* and *L. chalybaeiformis*, appear under *Parmelia*, whilst the third, a doubtful lichen (*Lichen hippotrichodes*, Ach. Prodr. 220) is omitted. Nor is the name *Setaria* revived in Acharius' great *Lichenographia Universalis*, both "Setarias" being merged there in the new genus *Alectoria* with references to the *Prodromus*, but without the *Setaria*-binominals of that work.

There is, therefore, no reason to attribute to Acharius the authorship of a lichen genus *Setaria*; but if that is so, can Beauvois' *Setaria* as the name of a genus of grasses be rejected on the ground adduced by Scribner? The species described and figured by Beauvois in his *Flore d'Oware et de Benin*, ii. 80, tab. 110, f. 2, as *Setaria longiseta*, which is supposed by Scribner to be the type of his genus *Setaria*, is clearly a *Setaria* in the sense in which that genus is generally accepted. It belongs to a group characterised by typically solitary spikelets arranged in loose panicles, each of them supported by a single persistent bristle, more or less turgid, with the fertile floret rather broad-backed and dorsally much curved and by rather narrow leaf blades, not folded between the primary nerves as is the case in the section *Ptychophyllum*. It is clearly not a *Pennisetum*. I am proposing to name the

group "*Panicatrix*" in allusion to the habit of the panicle which is that of a typical *Panicum*. But whilst *Setaria longiseta* is no doubt a *Setaria*, it is not the "type" of *Setaria*. Beauvois himself (l.c.) in the heading over the description of the genus quotes "*Setaria* Ess. d'Agrost." If we turn to his *Essai d'une nouvelle Agrostographie*, we find (1) on p. 51 the description of the genus "*Setaria* nob.," and a list of species to be transferred from *Panicum* to *Setaria*; then (2) on p. 178 (index) an enumeration of the new names under *Setaria*; (3) on p. 9 of the "Explication" the explanation of the figure of *Setaria viridis* which is intended to illustrate the genus; and lastly (4) on tab. 13 under fig. 3 a good picture of a spike of *Setaria viridis* with equally excellent analyses. Several of the combinations on p. 178 are queried; of those without a sign of interrogation all but two are recognised members of the *Eu-Setaria* group, namely *germanica*, *glauca*, *italica*, *setosa*, *verticillata* and *viridis*, the latter of which was, as already stated, chosen by Beauvois to illustrate the genus. The two doubtful species are *S. purpurea* and *S. sericea*, both taken over from *Panicum*. Of these *S. purpurea* is probably a true *Setaria*, whilst *S. sericea* is evidently *Pennisetum setosum*.

However that may be, there can be no doubt whatever that Beauvois meant his *Setaria* to include the species of the type of *Setaria viridis*, and this will have to be considered as the foundation of the genus. Scribner's mistake in taking Beauvois' *Setaria longiseta*, the only species mentioned in his *Flore d'Oware et de Benin*, as the "type" of the genus arose probably from the misleading date on the title-page of the second volume of that work. This is given as 1807, that of the *Essai d'une nouvelle Agrostographie* being 1812. The *Flore d'Oware et de Benin* was actually published in parts, those of volume ii. being spread over fourteen years (1808-1821). The dates of part 11 (pages 1-12, tt. 61-66), with which vol. ii. starts is 1808, of 12 and 13 (pages 13-32, tt. 67-78) 1810 (see Hallier in *Jahrb. Hamburg. Wissensch. Anst.* xvii. 67), whilst it appears from a notice in *Flora* v. part i. (1882) Beibl. i. p. 4, that only seventeen parts had been published by 1818. According to Hiern (in *Journ. Bot.* 1898, p. 495) part 17 contained tt. 97-112. The date of the publication of *S. longiseta* is therefore six years later than that of the *Essai d'une nouvelle Agrostographie*.

So far, then, Scribner's objections to the use of *Setaria* for the grass genus of that name cannot be sustained. Unfortunately, however, the confusion does not end here. In 1803 François André Michaux in his *Flora Boreali-Americana*, ii. 320-332, published an account of the Lichens collected by his father André Michaux. This account (i. p. ix.) followed the arrangement and nomenclature of the "recent" publication of Acharius (*Lichenum ordinem et denominationem suppeditavit recentior Acharius*), by which Acharius' *Lichenographiae Suecicae Prodomus* (1798) was meant, and not his *Methodus* (1803). Whether the latter appeared before or after the publication of Michaux's *Flora* I do not know, but it is clear from internal evidence that it had no influence on it. In the section dealing with the lichens Michaux follows the

plan adopted throughout the work of introducing each genus with a headline, giving the name and author and a diagnosis, after which follow the diagnoses and paragraphs with observations and a statement of the habitat. In the case of the lichens the diagnoses under the headlines are verbatim copies of the corresponding diagnoses of Acharius' "tribus," and the names in the headlines are those used to designate the "tribus," with the addition of "Ach." That Michaux actually intended to give Acharius' "tribus" the status of genera may be inferred not only from the typographical exposition which is in accordance with that adopted in the remainder of the work, but also from the fact that he forms his specific names by combining the specific epithet with the "tribus" name of Acharius, and not with the Linnean genus "lichen" as Acharius did. Now, among the "genera" recorded there, we find on p. 323 *Setaria* and as sole representative of it *S. trichodes*, both of which have to be credited to Michaux. What this *Setaria trichodes* which the elder Michaux collected in Canada was, is uncertain. Acharius, referring to it in a note in his *Lichenographia*, p. 594, says "utrum huius generis (i.e., *Alectoriae*) species sit an *Alectoriae jubatae* tantum varietas, dicere non audeo," and *Krempelhuber* (*Geschichte u. Literatur d. Lichenologie*, ii. 551) omits it altogether from the list of new species described by Michaux in his *Flora Boreali-Americana*; nor is it included in part vii. of Macoun's *Catalogue of Canadian Plants* which deals with the Hepatics and Lichens. In fact, the only reference to it seems to be in Tuckerman's *Synopsis of the North American Lichens*, part i. 44, where it is quoted as a synonym of *Alectoria jubata* var. *implexa*; but Tuckerman has evidently not seen it, as he quotes only Hall's (Rocky Mountains) and Richardson's (Arctic America) collections, nor do Nylander or Fries, whom he cites for *Alectoria* and the variety *implexa* respectively, refer to it. Thus *Setaria*, Michaux, is reduced to a diagnosis taken over purely mechanically from Acharius, and an insufficient species description which is, as far as we know, not supported by any actual material in existence, and may cover or not cover a plant answering to Acharius' "tribus" *Setaria*. To supersede the well-established name *Alectoria* on such slender and purely formal grounds will not serve any useful purpose, nor would it be in accord with the spirit or even the wording of the general rules governing botanical nomenclature. But if *Setaria*, Michaux, cannot stand for *Alectoria* nor as an independent genus, then the way is free for the admission of *Setaria*, Beauv., the grass genus.

I should not have considered it worth while to deal with a mere question of nomenclature in so detailed a way if Scribner's proposal did not concern a genus with very numerous species and entail consequently a great and very inconvenient change of names without consolidating or advancing our knowledge in any way.

XX.—NEW ORCHIDS: DECADE XLVII.

431. *Eulophia Huttonii*, Rolfe; in Dyer Fl. Cap. vol. v. sect. iii. p. 52, anglice; affinis *E. foliosae*, Bolus, labelli lobo intermedio haud concavo et carinis ad apicem verrucosis differt.

Rhizoma validum, nodis incrassatis. *Folia* 2-3, erecta, elongato-lineararia, acuta vel acuminata, crebre venosa, 15-30 cm. longa. *Racemi* densiflori, 2.5-7.5 cm. longi. *Bractee* lanceolatae, acuminatae, 0.6-1.2 cm. longae. *Pedicelli* circiter 1.2 cm. longi. *Flores* mediocres, brunnei vel rufi. *Sepala* elliptico-lanceolata vel oblongo-lanceolata, acuta vel subacuta, circiter 1.2 cm. longa. *Petala* elliptico-oblonga, subobtusata, sepalis paullo latiora. *Labellum* circiter 1.2 cm. longum, subaequaliter trilobum; lobi laterales subdivergentes, late oblongi, rotundati; lobus intermedius late oblongus vel suborbicularis, medio ad apicem 3-5 carinatus, carinis cristatis basi tenuioribus; calcar obsoletum. *Columna* clavata, circiter 6 mm. longa.

SOUTH AFRICA. Stockenstrom Div.; Katberg, *Hutton*, and in numerous other localities in the Coast, Kalahari and Eastern Regions.

The species has been confused with *E. aculeata*, Spreng., and *E. foliosa*, Bolus.

432. *Eulophia Boltonii*, Harv. et Rolfe; in Dyer Fl. Cap. vol. v. sec. iii. p. 53, anglice; affinis *E. foliosae*, Bolus, labello multo brevior et obscure trilobo differt.

Rhizoma validum, nodis incrassatis. *Folia* 2-3, erecta, elongato-lineararia, acuta, crebre venosa, 10-30 cm. longa, vaginis lanceolatis. *Scapi* laterales, erecti, 15-30 cm. alti, vaginis numerosis lanceolatis subimbricatis obtecti; racemi ovoidei vel oblongi, 2.5-5 cm. longi, densiflori. *Bractee* lineari-lanceolatae, acuminatae, 0.8-1.2 cm. longae. *Pedicelli* 8 mm. longi. *Flores* mediocres, virides, labello purpureo. *Sepala* ovato-lanceolata, acuminata, circiter 1.3 cm. longa, laterales paullo majores. *Petala* elliptico-lanceolata, acuta, sepalis multo breviora. *Labellum* late ovato-orbiculare, subtrilobum, 8 mm. longum; lobi laterales breves, late rotundati; lobus intermedius late ovatus, apiculatus, brevis; discus 3-5-carinatus, carinis tenuibus laevibus; calcar obsoletum. *Columna* clavata, 2 mm. longa, basi pede distincto instructa.

SOUTH AFRICA. Albany Div.: Featherstone Kloof; near Grahamstown, in grassy spots on the flat summit of the hills, *Bolton*, *MacOwan* 681. Stockenstrom Div.; Katberg, 600 m., *Hutton*.

This species has been more or less confused with *E. foliosa*, Bolus.

433. *Lissochilus Rehmannii*, Rolfe; in Dyer Fl. Cap. vol. v. sect. iii. p. 55, anglice; *L. chitellifero*, Reichb. f., similis, sed labelli calcare longiore et subcurvato differt.

Rhizoma et folia non visa. *Scapi* erecti, subgraciles, circiter 30 cm. alti, basi vaginis laxis obtecti; racemi laxi, circiter

10 cm. longi, multiflori. *Bractaeae* oblongo-lanceolatae, acuminatae, 4-8 mm. longae. *Pedicelli* graciles, 1.2-1.4 cm. longi. *Flores* parvi. *Sepala* elliptico-oblonga, acuta vel apiculata, 0.8-1.2 cm. longa. *Petala* ovata vel orbiculari-ovata, subobtusata vel subaciculata, sepalis duplo latiora. *Labellum* trilobum, petalis sublongius; lobi laterales breves, lati, truncati; lobus intermedius reflexus, obovatus, truncatus, subundulatus, 6 mm. latus; discus basi ad medium carinis 7 approximatis elevatis et verrucosis instructus; calcar oblongum vel lineari-oblongum, 4 mm. longum. *Columna* late clavata, 4 mm. longa.

SOUTH AFRICA. Transvaal; hills above Aapiies River, *Rehmann* 4297; hills near Pretoria, *McLea* in Herb. Bolus 5819A; kopje at Pretoria, *Miss E. Tennant* 4040; Koodoos Poort, near Pretoria, *Reck* 1004.

434. *Lissochilus transvaalensis*, *Rolfe*; in Dyer Fl. Cap. vol. v. sect. iii. p. 57, anglice; *L. aequali*, Lindl., similis, sed labello petalis longiore et obscure trilobo differt.

Folia 3, elongato-linearata, acuminata, prominenter trinervia, 20-30 cm. longa, basi conduplicata, vaginis spathaceis imbricatis obtecta. *Scapi* laterales, erecti, basi non visa, vaginis spathaceis obtekti; racemi laxi, 10-15 cm. longi, multiflori. *Bractaeae* ovatae vel ovato-lanceolatae, acuminatae, 2 cm. longae. *Pedicelli* graciles, 1.2-1.6 cm. longi. *Flores* mediocres. *Sepala* subconniventia, late oblonga, apiculata, 1.4-1.6 cm. longa. *Petala* elliptico-obovata, abrupte acuminata, sepalis paullo breviora. *Labellum* obscure trilobum, 2 cm. longum; lobi laterales breves, apice rotundi; lobus intermedius ovato-oblongus, undulatus; discus medio fere ad apicem lamellis elevatis tenuibus crenulatis infra apicem tuberculatis ornatus; calcar late conicum, obtusum, 4 mm. longum. *Columna* clavata, 1 cm. longa.

SOUTH AFRICA. Kalahari Region: Transvaal; Izaneen, Zoutspanberg, 830 m., *Burt-Davy* 2900.

435. *Polystachya natalensis*, *Rolfe*; in Dyer Fl. Cap. vol. v. sect. iii. p. 65, anglice: *P. transvaalensi*, Schlechter, similis, sed labello et petalis longiore et obscure trilobo differt.

Caules aggregati, erecti, cylindrici, 7-15 cm. longi, apice diphylli, basi vaginis angustis obtekti. *Folia* oblonga, obtusa, coriacea, 5-7.5 cm. longa, 1.2-2 cm. lata. *Scapi* erecti, 5-7.5 cm. longi, 3-5-flori, vaginis angustis obtekti. *Bractaeae* triangulares, acuminatae, concavae, 3-4 mm. longae. *Pedicelli* 6 mm. longi. *Flores* mediocres, olivacei vel brunneo-purpurei. *Sepalum* posticum ovato-oblongum, subobtusum, 6-8 mm. longum; sepala lateralia late triangularia, subobtusata, 1.2 cm. longa. *Petala* anguste subspathulata, apiculata, 6 mm. longa. *Labellum* spathulatum, 8 mm. longum, late unguiculatum; limbus late ovatus, subobtusus, subundulatus, 6 mm. longus; discus callo erecto quadrato ornatus. *Columna* lata, brevis, pede 6 mm. longo. *Capsulae* ellipsoideo-oblongae, angulatae, 2.5 cm. longae.

SOUTH AFRICA. Eastern Region: Natal; Richmond, 760 m., *Sanderson* 823.

436. **Phalaenopsis (§Stauroglottis) latisejala**, Rolfe; a *P. denticulata*, Reichb. f., sepalis et petalis latioribus et magis ellipticis differt.

Folia 3-4, late elliptica, obtusa vel obscure biloba, recurva, 9-12 cm. longa, 5-8 cm. lata. *Scapus* nanus, suberectus, circiter 7 cm. longus, subteres, 5-6-florus. *Bracteae* patentes, ovatae, obtusae, concavae, 3 mm. longae. *Pedicelli* 1.2-1.5 cm. longi. *Flores* mediocres. *Sepalum* posticum late ellipticum vel suborbiculari-ellipticum, obtusum, 1 cm. longum, 7-8 mm. latum; sepalia lateralibus suborbiculari-ovata, obtusa, 1.2 cm. longa, 1 cm. lata. *Petala* late elliptica, obtusa, 1 cm. longa, 7-8 mm. lata. *Labellum* 3-lobum; lobus intermedius anguste obovato-oblongus, obtusus, trigonus, 1.8 cm. longus, subcarinatus, prope apicem hispidus; lobi laterales lineari-oblongi, trigoni, apice bidenticulati, 5 mm. longi; discus medius appendiculo bicuspidato instructus, infra medium appendiculo lineari-oblongo incurvo 2 mm. longo instructus. *Columna* clavata, 2 mm. longa.

HABITAT UNKNOWN.

Flowered in the collection of M. Roger Liouville, of Maure, Ille-et-Villaine, France, in April, 1914, when it was sent for determination through Sir Frederick W. Moore, of the Royal Botanic Garden, Glasnevin. The sepals and petals are greenish-yellow, with rows of red-brown dots, and the lip white with a purple apex. The flowers are said to be violet-scented.

437. **Phalaenopsis (§Stauroglottis) Micholitzii**, Rolfe; *P. tetraspidi*, Reichb. f., similis, sed scapis brevioribus et labelli lobo intermedio longe hirsuto differt.

Folia sessilia, obovato-elliptica, obtusa, circiter 18 cm. longa, 6-7 cm. lata, coriacea, basi cuneata. *Scapus* suberectus, flexuosus, pauciflorus (basi non visa). *Bracteae* ovato-oblongae, obtusae, cucullatae, 5 mm. longae. *Pedicelli* circiter 2 cm. longi. *Flores* circiter 4 cm. lati. *Sepalum* posticum late ellipticum, subobtusum, circiter 2.3 cm. longum, 1 cm. latum; sepalia lateralibus ovato-elliptica, subacuta, 2.3 cm. longa, 1.2 cm. lata. *Petala* late elliptica, obtusa, 2 cm. longa, 1.1 cm. lata. *Labellum* trilobum; lobus intermedius anguste obovato-oblongus, carnosus, 1.5 cm. longus, basi carinatus, apice longe hirsutus; lobi laterales falcato-oblongi, oblique acuti, 5 mm. longi; discus bicallosus, callo utroque bicuspidato. *Columna* clavata, 7 mm. longa.

MALAYA. Without precise locality, W. Micholitz.

Introduced in 1889 by Messrs. Sander, St. Albans, through their collector, W. Micholitz, and flowered in their establishment at St. Albans in the following year. The flowers are cream-white in colour, and somewhat resemble those of *P. tetraspis*, Reichb. f., but they have far longer and less numerous hairs on the lip.

438. **Angraecum (§Tridactylites) Hislopianum**, Rolfe; *A. tridentato*, Harv., simile, sed foliis et floribus fere duplo majoribus differt.

Fruticosus. *Caulis* erectus, validus, 10 cm. altus vel major. *Folia* patentia, subteretia, obtusa, 5-7 cm. longa, circiter 3 mm.

lata; vaginae amplexicaules, 1 cm. longae, striatae et verrucosae. *Racemi* axillares, circiter 2 cm. longi, flexuosi, 2-3-flori. *Bractee* patentes, ovatae, truncatae, amplexicaules, 2 mm. longae. *Pedicelli* 4 cm. longi. *Sepalum* posticum elliptico-oblongum, obtusum, 4 mm. longum; sepala lateralalia ovata, obtusa, 4 mm. longa. *Petala* oblonga, subobtusa, 4 mm. longa. *Labellum* oblongum, supra medium tricuspidatum, 4 mm. longum; lobus intermedius obtusus, lobi laterales subacuti; calcar subfusiforme, 0.9-1 cm. longum. *Columna* lata, 2 mm. longa.

TROPICAL AFRICA. S. Rhodesia, *A. Hislop* 67.

Similar in habit to the imperfectly-known *Angraecum tridentatum*, Harv., which is a native of Natal, but larger in all its parts, and with a more elongated inflorescence.

439. **Angraecum Bolusii**, *Rolfe*; in Dyer Fl. Cap. vol. v. sect. iii. p. 73, anglice; ab *A. tridentato*, Harv., sepalis ovato-lanceolatis et labelli angulis subulatis differt.

Caules subgraciles, subflexuosi, 7-12 cm. longi. *Folia* sparsa, semicylindrica, gracilia, depressa, supra anguste canaliculata, curvata, 6-10 cm. longa, vaginis striatis. *Flores* fasciculati, pauci, breviter pedicellati, parvi, pallide flavi. *Sepala* lateralalia patentia, ovato-lanceolata, acuta, 3 mm. longa, basi subcordata, apice reflexa; sepalum posticum ovatum, acutum, 3 mm. longum, recurvum. *Petala* triangulari-lanceolata, acuta, recurva, sepalis paullo minoribus. *Labellum* patens, oblongo-lanceolatum, circiter 3 mm. longum, apice trilobum, basi lobis oblongis patentibus instructum; calcar cylindricum, pendulum, 6 mm. longum. *Columna* lata, brevis; rostellum late ovatum, acuminatum; pollinia sphaerica; stipes cuneato-rhomboideus; glandula ovato-elliptica. *A. tridentatum*, Bolus, Ic. Orch. Austr.-Afr. vol. i. t. 53 (non Harv.).

SOUTH AFRICA. Eastern Region: Zululand; near Eshowe, *Maxwell in Herb. Bolus* 6319.

A more slender plant than *A. tridentatum*, Harv., with much broader sepals and a differently-shaped lip.

440. **Brownleea Fanniniae**, *Rolfe*; affinis *B. Galpinii*, Bolus, floribus duplo majoribus et labello latiore differt.

Herba terrestris (basi non visa). *Caulis* subgracilis. *Folia* caulina, sessilia, suberecta, lanceolato-linearalia, acuminata, 6-9 cm. longa, 5-8 mm. lata. *Spicae* ovoideae, 2.5-4.5 cm. longae, densiflorae. *Bractee* ovato-lanceolatae, acutae, 1-1.5 cm. longae. *Pedicelli* 0.8-1 cm. longi. *Flores* pallidi, petalis sparse purpureo-maculatis. *Sepalum* posticum cum petalis in galeam connivens, 8-9 mm. longum et latum, limbo late subpandurato subundulato calcare 6 mm. longo basi conico deinde subgracili; sepala lateralalia elliptico-oblonga, subobtusa, 8 mm. longa. *Petala* cum sepalo postico connata. *Labellum* parvum, latum, columnae appressum. *Columna* lata, 2 mm. longa; rostellum lobi cuneato-oblongi, tridenticulati, 2 mm. longi.

SOUTH AFRICA. Natal; Dargle Farm, *Mrs. Fannin* 98.

Described from a specimen in the Trinity College Herbarium,

Dublin. *B. Galpinii*, Bolus, Ic. Orch. Austr. Afr. i. t. 42, fig. 9-11, from the southern slopes of Mount Currie, Griqualand East, at 1830 m., *Tyson* 1074, must be very nearly allied, but I have not seen a specimen.

XXI.—DECADES KEWENSES

PLANTARUM NOVARUM IN HERBARIO HORTI REGII CONSERVATARUM DECAS XCVII.

961. ***Rubus* (§*Idaeobatus*) *chambica*, Rolfe** [Rosaceae-Rubeae]; a *R. concolore*, Wall. floribus minoribus saepe in racemos laxos dispositis differt.

Frutex, rami subteretes, glabriusculi, sparse aculeolati, 1-1.75 m. longi. *Folia* ternata vel rarius pinnate 5-foliolata, concoloria, 15-20 cm. longa; stipulae lineari-lanceolatae, acuminatissimae, 1-1.5 cm. longae; foliolus terminalis petiolatus, late ellipticus vel ovato-ellipticus, acutus vel breviter acuminatus, crenulatus, interdum irregulariter lobatus, 8-11 cm. longus, 5-7 cm. latus; foliola lateralia subsessilia, oblique ovata, acuta, crenulata, 5-8 cm. lata; petioli puberuli, sparse aculeolati, 7-9 cm. longi. *Racemi* terminales et axillares, pauciflori vel laxiflori, pubescentes, parce aculeolati, 3-5 cm. longi. *Pedicelli* pubescentes, parce aculeolati, 1-1.5 cm. longi. *Calyx* 5-partitus; segmenta patentia, ovata, acuminatissima, pubescentia, circiter 1.5 cm. longa. *Petala* obcordato-orbicularia, 0.7 cm. longa, alba. *Stamina* numerosa, glabra, 3 mm. longa. *Carpella* numerosissima, sparse hirsuta, 1 mm. longa; styli glabri, 3 mm. longi.

INDIA. Chamba State: Pangi; Kagal Reserve, 2250 m., *R.N. Parker*.

Said to be a shrub of moist undergrowth, with branches 3-6 ft. long, mostly but not always dying to the ground in winter. The species belongs to the group of *R. gracilis*, Wall., and is allied to *R. concolor*, Wall., which in the Flora of British India is included under the aggregate species *R. niveus*, Wall.

962. ***Brassaiopsis magnifica*, Dunn** [Araliaceae-Schefflereae] affinis *B. aculeatae*, Seem. in caule aculeato et racemis nutantibus, sed tomento foliisque peltatis differt.

Arbor 3 m. alta. *Caulis* brunneus aciculis deciduis spinisque conicis persistentibus dense tectus. *Folia* 6-7, coronam grandem super vertice formantia, peltata, 5-loba, 80 cm. longa et lata, lobis ovatis acutis caudatis ad 25 cm. longis, sinubus acutis, supra glabra, infra praecipue in nervis ut inflorescentia aurantiacotomentosa, margine ubique deflexo cartilagineo serrato; nervi circum umbonem 22 cm. intra basin dispositum 12, stellatim radiantes, validi; petioli 50 cm. longi, glabri. *Flores* (alabastra tantum visa) in pedunculis racemosis 7-9 cm. longis 2-5 cm. umbellatim aggregati, rachi communi 30-50 cm. longa sub foliis nutante; pedicelli 1.5 cm. longi basi bracteis 2 mm. longis interne glabris suffulti. *Sepala* et *petala* 5, valvata, triangularia. *Stamina* 5. *Ovarium* 2 (-3) -loculare, 2 (-3) -ovulatum.

Fructus maturus ovoideus glaber, 7 mm. longus, stylo 2-3 mm. longo, stigmatibus capitato. *Semina* in quoque loculo singularia albumine ruminato.

EASTERN HIMALAYA. Abor Hills: Janakmukh and frequent elsewhere in high forest, 250-1000 m. Flowers in December and January. *Burkill* 37130.

963. **Ophiorhiza heterostyla**, *Dunn* [Rubiaceae-Hedyotideae] *O. oppositiflorae*, Hook. f. affinis, sed corollae tubo intus hirsuto distincta.

Herba perennis, basi lignosa, laxe ramosa, procumbens, praeter inflorescentiam glabra, 30-40 cm. alta. *Folia* lanceolata, sensim acuminata, basi acuta, 10-15 cm. longa, papyracea, petiolis 3-4 mm. longis, nervis intra marginem arcuatis 6-8-paribus. *Flores* in cymas puberulas terminales aggregati, albi apice rubri, sursum inclinati; pedicelli 3 mm. longi; bracteolae minutae. *Calyx* cum ovario 2.5 mm. longus, dentibus 1 mm. longis distantibus linearibus. *Corolla* tubulosa, extus glabra, tubo 8 mm. longo intra infra faucem annulo hirsuto ornato in forma longistyla basi paulo incrassato, dentibus 4-5 cm. longis revolutis. *Stamina* basi corollae affixa; antherae in annulum versus basin tubi collectae vel ultra faucem exserta. *Stylus* in forma brevistyla in tubo inclusus, in forma longistyla ultra faucem exsertus. *Fructus* ignotus.

EASTERN HIMALAYA. Abor Hills: in the Lalik and Igar valleys; south face of Bapu; Rengging and Rotung, 800-1100 m., always in deep shade, flowering in February and March. *Burkill* 36116, 36616, 37334, 38158, 38171. Heterostylism occurs in other species of this genus. The ring of hairs assists the device and would not be expected to vary in the same species as does the length of stamens and style.

964. **Psychotria aborensis**, *Dunn* [Rubiaceae-Psychotrieae] *P. calocarpae*, Kurz affinis, sed foliis late ovatis subtus in venis tomentosis distincta.

Frutex 2 m. altus. *Caules* albi, cavi, fragiles. *Folia* late ovata, apice basique breviter acuminata, 20-24 cm. longa, chartacea, supra glabra, subtus praecipue in nervis ut petioli stipulae peduncululi pedicelli calycesque breviter tomentosa, nervis 10-12-paribus in nervum intramarginalem pulchre anastomosantibus; petioli 3-5 cm. longi; stipulae spathulatae, caudatae, 1.5-2.0 cm. longae. *Paniculi* fructiferi terminales, subsessiles, 5-7 cm. longi. *Pedicelli* 1-2 mm. longi. *Calycis* dentes 1-2 mm. longi, lineares. *Bacca* ovoidea, 1 cm. longa, 7 mm. diametro; cocci dorso uncostati, latere ventrali concavi.

EASTERN HIMALAYA. Outer Abor Hills: Rotung; on the hill side over the Dihong in dense shade, 450 m. Fruits in December and January. *Burkill* 37601.

965. **Agapetes marginata**, *Dunn* [Vacciniaceae-Thibaudieae] *A. grandiflorae*, Hook. f. affinis, sed calyce ovarioque setosis et foliis obovatis distincta.

Frutex epiphyticus. *Radix* tuberosa, fusiformis, 30 cm. longa,

18 cm. diametro. *Folia* obovata, breviter acuminata, versus basin attenuata, tandem rotundata, subsessilia, 20–24 cm. longa, 8–11 cm. lata, coriacea, glabra; nervi marginem appropinquantes 20–22-pares, nervo valido intramarginali conjuncti, omnibus cum reticulo ixsiccitae praecipue subtus prominentibus. *Flores* in racemis abbreviatis ex nodis ramorum vetustiorum ortis; rachis 2 cm. longa, bracteis parvis triangularibus; pedicelli 2·5–3 cm. longi ut ovaria calycesque setis glandulosis dense tecti, apice articulati. *Calycis* dentes 5, ex tubo brevissimo lineares, 1 cm. longi. *Corolla* tubulosa, medio paulo inflata, 4 cm. longa, extus in venis praecipue versus apicem setulosa, dentibus 5 obtusis 6 mm. longis. *Stamina* 10, corollae basi affixa, apice paulo exserta, antheris granulatis subsessilibus 3 mm. longis, apice longissime bitubulosis. *Ovarium* globosum, 2·5 mm. diametro.

EASTERN HIMALAYA. Outer Abor Hills: in the oak forest above Upper Rengging Camp; 900–1700 m. Flowering in January. *Burkill* 36340.

966. *Agapetes nutans*, Dunn [Vacciniaceae-Thibaudieae] *A. linearifoliae*, C. B. Clarke affinis, sed foliis vix involutis pedunculisque 6–7 cm. longis distincta.

Frutex epiphyticus. *Radix* crassa. *Ramuli* graciles. *Folia* linearia, apice longe caudata, basi sensim acuta, subsessilia, margine paulo involuto, glabra, 12–15 cm. longa, chartacea. *Flores* apicibus corollae exceptis glabri, in racemis axillaribus abbreviatis longe pedunculatis, pedunculo nutante 6–7 cm. longo pilis brevibus crispis albis vestito; pedicelli 1·2 cm. longi; bractee parvae lineares. *Calycis* dentes basi brevissime coaliti, anguste triangulares, 4 mm. longi. *Corolla* tubulosa 2·2 cm. longa, 3 mm. diametro, coccinea, 5-plicata, dentibus acutis 3 mm. longis apice viridibus. *Stamina* 10, basi corollae affixa; antherae in parte pollinifera granulatae, subsessiles, 6 mm. longae, apice longe bitubulosae, paulo exsertae. *Stylus* aequilongus. *Ovarium* globosum, 2·5 mm. diametro.

EASTERN HIMALAYA. Outer Abor Hills: in high forest on a "razor edge" ridge between Serpo and Lalik; 1700 m. Flowers in January and February. *Burkill* 36347.

967. *Buddleia candida*, Dunn [Loganiaceae-Euloganieae] ab *B. macrostachya*, Benth. foliis rugosis primo albo-tomentosis recedit.

Frutex primo albo-tomentosus, ramulis tandem subglabris brunneis. *Folia* lanceolata, apice basique sensim acuminata, crenulata, rugosa, chartacea, 12–17 cm. longa, 3–5 cm. lata, utrinque primo albo-lanata, tandem superne subglabra; petioli 1·5 cm. longi. *Flores* sessiles, 1–5-ni, plerumque 3-ni in racemos vel paniculas terminales 10–12 cm. longas collecti; bractee lanceolatae, 3 mm. longae, ut folia, calyces, corollaeque vestitae. *Calyx* tubulosus, 3 mm. longus, lobis 4 lanceolatis 1·5 mm. longis. *Corolla* violacea, 6 mm. longa, tubulosa, lobis 4 patentibus ovatis 1 mm. longis. *Antherae* sessiles, paulo infra faucem insertae. *Ovarium* lanceolatum, hirsutum, 2 mm. longum; stigma clavatum

subsessile. *Fructus* capsularis, oblongus, 6 mm. longus, tomentosus.

EASTERN HIMALAYA. Outer Abor Hills: Sidi river mouth and opposite Yambung on the north side of the Dihong; as low bushes scattered in the sward. Flowers in January. *Burkill* 37631.

968. *Aeschynanthus Monetaria*, *Dunn* [Gesneraceae-Cyrtandreae] ab omnibus speciebus Indicis foliis disciformibus recedit.

Caulis repens, primo puberulus, mox glaber, pallide brunneus, 2 mm. diametro, ex nodis 1.5-2.5 cm. distantibus fibros radicales folia pedunculosque emittens. *Folia* opposita, nummularia, 1.1-1.2 cm. diametro, crassa, evenia, glabra, integra, petiolis 1-2 mm. longis. *Flores* axillares, solitarii; bracteae minimae; pedicelli ut sepala corollaeque pilis parvis albis articulatis sparse vestiti, 1-2 cm. longi. *Sepala* libera, lineari-lanceolata, 4 mm. longa, 1 mm. lata. *Corolla* splendide coccinea, 3-4 cm. longa, tubulosa, curvata, superne horizontalis, fauce 1 cm. lata; labium superum e lobis duobus apice rotundatis 4 mm. longis et 6 mm. latis constitutum; lobi laterales reflexi, 5 mm. longi, 3 mm. lati; lobus anticus patens, 4 mm. longus, 3 mm. latus. *Filamenta* 2 cm. longa, glabra, antheris 2 mm. longis. *Ovarium* 8 mm. altum, stipite 2 mm. longo suffultum; stylus 3 mm. longus. *Fructus* ignotus.

EASTERN HIMALAYA. Outer Abor Hills: Janakmukh; abundantly all over the upper part of a tree on Bapu, at Rengging and at Rotung 300-800 m. Flowers in December. *Burkill* 36088, 37186.

969. *Rhinacanthus grandiflorus*, *Dunn* [Acanthaceae-Justicieae] a *R. calcarato*, Nees calyce campanulato et cymis densis sessilibus recedit.

Frutex glaber, ad 1 m. altus, e nodis inferioribus radicans, in parte herbacea cystolithis brevibus albis tectus. *Folia* ovata, apice basique subito acuminata, 13-17 cm. longa, 5-8 cm. lata, chartacea, nervis 8-paribus cum rete siccitate prominulis; petiolus 1.5-3 cm. longus. *Cymi* terminales, densi, sessiles; bracteolae parvae, triangulares, 1 mm. longae; pedicelli 3 mm. longi. *Flores* albi, magni, conspicui. *Calyx* campanulatus, 2-3 mm. longus, dentibus angustis tubum aequantibus. *Corolla* 5-7 cm. longa; tubus cylindricus, 1.5-2 mm. diametro; limbus 4-lobus, lobo superiore lineari caudato 1.5 cm. longo erecto, 3 inferioribus obtusis in labium 2 cm. longum et latum coalitis. *Stamina* 2, ex parte tubi superiore orta; antherae ex fauce breviter exsertae, apice basique muticae, loculis suprapositis, polline lineis opacis et vinculis nodulorum longitudinaliter notato. *Cap-sula* oblonga, 3 cm. longa, basi in stipitem solidum contracta. *Semina* 4 (2 saepe abortiva) disciformia, rugosa, 5 mm. diametro.

EASTERN HIMALAYA. Outer Abor Hills: common in shade of Shingkeng and other woods at Janakmukh and Ramidambang. Flowers in December. *Burkill* 37117, 36409.

970. *Gomphostemma aborensis*, *Dunn* [Labiatae-Prasieae] a *G. microcalyce*, Prain foliis late ovatis distincta.

Herba decumbens, praeter corollas breviter tomentosa. *Caulis* obtuse quadrangularis, in parte prostrata radicans. *Folia* late ovata, apice obtusa, basi subito acuminata, 5-8 cm. longa, crenato-serrata, subtus reticulata; petioli 2-3 cm. longi. *Flores* 4-8-ni, in verticillis axillaribus sessiles. *Calyx* anguste campanulata, 1 cm. longa; dentes tubum aequantes, anguste triangulares. *Corolla* luteola, 2.5 cm. longa, intus et extus pubescens; limbus tubo 1 mm. lato 4-plo brevior; labium superius erectum, anguste ovatum; labium inferius patens, tri-lobatum. *Stamina* superiora sub fauce inserta, inferiora paulo infra orta, antheris omnibus parallelis e fauce breviter exsertis. *Ovarium* 4-partitum; stylus stamina paulo excedens. *Nucula* 1, carnosae.

EASTERN HIMALAYA. Outer Abor Hills: Janakmukh; very common, and at the mouth of the Yamne near Pongging. Flowers in December. *Burkill* 37269.

XXII.—MISCELLANEOUS NOTES.

MR. G. G. AUCHINLECK, B.Sc., Assistant Director of the Department of Agriculture, Mauritius (*K.B.*, 1914, 227), and CAPT. NORMAN MARSHALL have been appointed by the Secretary of State for the Colonies, the latter on the recommendation of Kew, Divisional Agricultural Officers in the Department of Agriculture, Ceylon.

MESSRS. F. W. HALL and G. T. PHILPOTT, members of the gardening staff of the Royal Botanic Gardens, Kew, have been appointed by the Secretary of State for the Colonies, on the recommendation of Kew, Assistant District Agricultural Officers in the Department of Agriculture, Uganda.

WILLIAM JAMES TUTCHER.—The news of the sudden death of Mr. Tutchet in Hongkong will be received with great regret by his many friends in England. His loss to the English community in the little Crown Colony in which he had lived for nearly thirty years will be keenly felt, and the Chinese staff of his department will also mourn one who always understood and cared for them. The example of unwearying attention to duties and his enthusiasm for botanical and horticultural enterprise in the colony was a splendid training for his subordinates. During the three decades of his work he has built up a lasting memorial in the affection of his Chinese and English friends as well as in the various gardens and ornamental spaces that he did so much to establish and to keep in fine orderly condition for the public of Hongkong. One of the works which fell to his lot was the laying out of the golf course at Fanling, which has grown into one of the most beautiful places of recreation in the colony, thanks largely to his skill and perseverance.

William James Tutchet was born near Bristol in 1867, and educated at the Merchant Venturers School in that city. With

the technical scientific training there received, and after five years' experience in good private gardens, he came to the Royal Botanical Gardens, Kew, in 1888, as a "young gardener." His progress here was so satisfactory that two years later he was promoted to the post of sub-foreman, and placed in charge of the orchid department. In 1891 as an accomplished and reliable young man, he was recommended to the Secretary of State for the Colonies as Assistant Superintendent to Mr. Ford in Hongkong. Before leaving England he had married Miss Elizabeth Aikman, sister of Mr. John Aikman, then and still assistant in the Director's Office at Kew, thus further cementing an association which he was destined to maintain as long as he lived to the mutual advantage of his new department and the one he was leaving.

Mr. and Mrs. Tutchet were very happy in Hongkong and very busy. His free days were nearly always spent in botanical exploration of the island, and for many years he might be seen on almost any fine holiday tramping off to Mt. Parker, from whose gulleys and ravines he usually returned about nightfall and emptied out on the herbarium table his miscellaneous spoils. A glance at the list of additions to the Hongkong flora during his time gives some idea of the success of his outings.

In 1915, he published as a supplement to his report an account of an expedition to an area on the N. River, which had not been previously visited by a botanist. To do this he took advantage of four consecutive holidays and returned with examples of five new species as well as of a great many additions to the provincial flora.

In 1904, he became a Fellow of the Linnean Society, and attended the meetings at Burlington House on the rare occasions when he was on leave. In 1910 he became Superintendent of the Botanical and Forestry Department. In 1912 he published with his predecessor, Mr. S. T. Dunn, the Flora of Kwangtung and Hongkong as vol. X. of the Additional Series of this periodical, to which he contributed the description of the Orchidaceae (of which he had a special knowledge), as well as of most of the Monocotyledons. He had previously published a small work on Gardening in Hongkong. No one knew better than he the difficulties of the climate, and how they could be overcome, and his publication was greatly appreciated in Hongkong and neighbouring parts of China.

The herbarium of his department contains, of course, the great bulk of Mr. Tutchet's botanical specimens, but several hundreds of them may be seen in the Kew Herbarium, and in that at Manila (P.I.).

The genus *Tutcheria* was founded by Mr. Dunn on a tree in the Hongkong Botanical Gardens which had been supposed to be *Camellia reticulata*, Lindl., until Mr. Tutchet pointed out its distinctive characters (cf Journ. Bot. xlv. 324). Many new species discovered by Mr. Tutchet were at different times called after him. He himself published many novelties, including a new genus (*Dunnia*, Tutchet, *Rubiaceae*, Journ. Linn. Soc. xxxvii. 69) *Quercus Elizabethae*, Tutchet, called after his wife

(cf. Journ. Bot. xlix. 273). Besides these articles Tutchter published the annual reports of the department during his term as Superintendent, as well as on various occasions when he was acting in that capacity. All these reports contain items of great botanical and economic interest, besides the records of the horticultural and forestry work of the colony. S. T. D.

Aloe Specimens from Pretoria.—A valuable collection of Aloe specimens—eventually to be representative of the whole of Southern Africa—is being amassed at Pretoria, where the plants thrive in a naturally rugged setting round the Union Buildings. Of these Dr. I. B. Pole-Evans has recently forwarded a fine set of 56 named herbarium specimens, of which no less than 22 are new to Kew. These, retaining to a remarkable degree their colouring and bloom, form a marked contrast to the majority of dried succulents, and should prove an invaluable addition to our shelves.

South African Aloes*.—Dr. Pole-Evans contributes a paper on the genus Aloe in South Africa, no less than 110 species being recorded. Of these as many as 60 species are in cultivation at Kew at the present time. (See below.) The paper lays stress upon the fact that certain Aloes of reputed South African origin, which have for centuries been under cultivation in Europe, are at present unknown in South Africa; others, however, have in recent years been re-discovered in the land of their origin. *A. succotrina*, Lam., comes under the latter category, for although it is the first South African Aloe known to be cultivated in Europe, being figured and described in *Horti Medici Amstelodamensis* as early as 1697, its actual home on the slopes of Table Mountain remained unrecorded until about fourteen years ago. Interest in members of the genus has been sustained and lucid notes are given on the parts played by Miller, Linnaeus, William Aiton, Haworth, Bowie, Salm-Dyck, Thomas Cooper, J. G. Baker, Schonland, Marloth and others, while tribute is paid to the valuable monograph on the subject by Alwin Berger. A taste for the cultivation of Aloe rockeries has of late been created in South Africa and this should be fostered by the practical advice afforded by the paper, while it is evident that Dr. Pole-Evans foresees that results valuable to science may accrue from the co-operation of an interested public.

List of aloes mentioned in "Our Aloes," by Dr. Pole-Evans, cultivated at the Royal Botanic Gardens, Kew.

<i>Aloe aculeata</i> , Pole-Evans.	<i>A. arborescens</i> , Mill.
<i>A. africana</i> , Mill.	<i>A. aristata</i> , Haw.
<i>A. albispina</i> , Haw.	<i>A. Bainesii</i> , Dyer.

* Our Aloes, by I. B. Pole-Evans, M.A., D.Sc., F.L.S., Journ. Bot. Soc. S. Afr. Pt. V. pp. 11-16 (1919).

- A. Brownii*, Baker.
A. caesia, Salm-Dyck.
A. candelabrum, Berger.
A. castanea, Schonl.
A. chloroleuca, Baker.
A. ciliaris, Haw.
A. commixta, Berger.
A. Cooperi, Baker.
A. Davyana, Schonl.
A. drepanophylla, Baker.
A. Dyeri, Schonl.
A. ferox, Mill.
A. glauca, Mill.
A. globuligemma,
 Pole-Evans.
A. grandidentata,
 Salm-Dyck.
A. Greatheadii, Schonl.
A. Greenii, Baker.
A. latifolia, Haw.
A. leptophylla, N.E.Br.
A. lineata, Haw.
A. longibracteata,
 Pole-Evans.
A. longiflora, Baker.
A. macracantha, Baker.
A. Marlothii, Berger.
A. mitriformis, Mill.
A. nitens, Baker.
A. nobilis, Haw.
A. obscura, Mill.
A. parvibracteata, Schonl.
A. Pearsonii, Schonl.
A. Peglerae, Schonl.
A. petricola, Pole-Evans.
A. Pienaarii, Pole-Evans.
A. platylepis, Baker.
A. plicatilis, Mill.
A. pluridens, Haw.
A. purpurascens, Haw.
A. rubro-lutea, Schinz.
A. Salm-Dyckiana, Schultes
A. saponaria, Haw.
A. sessiliflora, Pole-Evans.
A. Simii, Pole-Evans.
A. speciosa, Baker.
A. spicata, L.
A. striata, Haw.
A. striatula, Haw.
A. succotrina, Lam.
A. suprafoliata, Pole-Evans.
A. supralaevis, Haw.
A. tenuior, Haw.
A. Thraskii, Baker.
A. variegata, L.
A. virens, Haw.
A. Wickensii, Pole-Evans.

Flora of Uitenhage and Port Elizabeth.*—The Committee of the Botanical Survey of the Union of South Africa (see *Kew Bull.* 1920, p. 402), realising the importance of the linking of stages of progress by a periodical summing-up of data in the form of check-lists and local and regional flora-records, made provision for the occasional publication of "Memoirs of the Survey," No. 1 of which, entitled the "Phanerogamic Flora of the Divisions of Uitenhage and Port Elizabeth," has now appeared. The Survey is to be congratulated upon the publication of a paper which is so comprehensive in its treatment and which, at the same time, reveals the incompleteness of the present state of exploration. Dr. Schonland reports that large areas of the northern and north-western portions of the division of Uitenhage are, from a botanical point of view, very little known: this statement alone may be regarded as a promise for the botanical conquest of such regions, and it stands as a challenge to those who have the opportunity to contribute towards such an achievement.

The region under discussion reaches from the Sundays to the Gamtoos River, and from the Indian Ocean about fifty miles in-

* Botanical Survey of South Africa, Memoir No. 1. Phanerogamic Flora of the divisions of Uitenhage and Port Elizabeth, by S. Schonland. To be obtained from the Librarian, Agricultural Department, Union Buildings, Pretoria. Price 2s. 6d.

land, thus including the Klein Winterhoek Mountains and the Zuurberg Range. It is an area which constitutes an important phytogeographical boundary between the "Eastern" and the "South-Western" Regions, and this point is ably discussed in the paper. In this connection mention may be made of the practical way in which the plant list itself indicates the relation of the flora with that of the Cape Peninsula and Natal respectively, distinguishing signs being attached to species which the area holds in common with one or other of the regions to which it stands as a buffer. Interesting details regarding the topography and geology of the Divisions are followed by careful climatic analyses which emphasise such points as: the effect of winds upon the dispersal of western types; temperature contrasts; the approximate balance of winter and summer rains; the parts played by mists and by drought and the need for irrigation in the Uitenhage division.

A region, merging from a low coastal belt to an altitude of nearly 5000 ft. and traversed as it is by such a series of minor mountain ranges with alternating plateaux, may be expected to offer ample scope for the study of ecological problems, and Dr. Schonland touches upon the various types of plant-life represented by his list. There is the vegetation of the *sand-dunes*, and of the *halophilous meadows* (notably the "fields by the Zwartkops River" mentioned by Ecklon and Zeyher), a record of the rare plants of the latter being given: on the Van Staden Mountain *south-western hill vegetation* predominates, while the Coastal Plateau shows an interesting mingling of *south-eastern and south-western types*. Then *Karrooid Succulents* are seen to prevail in the north-western parts, while mingled with these is the Thorn Scrub, itself preponderating in the Addo Bush where it still forms a shelter for herds of elephants. Pure *Grassland formation* is found on the Zuurberg, on the "Grass Ridge" east of Uitenhage and east of the Sundays River near its mouth. Pure *Acacia formation* and *Forest Patches* also occur, in addition to which record is made of water and swamp plants and of phanerogamic epiphytes and parasites.

The records are based on the specimens in the herbarium of the Albany Museum, collected mainly by Drège, Ecklon and Zeyher, H. Bolus, MacOwan, Schlechter, Mrs. T. V. Paterson, Rogers, F. H. Holland and Kemsley.

Systematic Elements of the Flora.

—	Orders.	Genera.	Species.	Non-native species.
Gymnosperms ...	3	3	7	—
Monocotyledons ...	22	203	637	about 23
Dicotyledons ...	104	510	1,668	" 81
Totals ...	129	716	2,312	" 104

Proportion of genera to species, 1: 3·2.

" Monocotyledons to Dicotyledons, 1: 2·6.

The Flora which consists of 118 pages and a sketch map of the region includes a covering letter from Dr. I. B. Pole-Evans, Director of the Botanical Survey of South Africa, to the Secretary for Agriculture and a commendatory Preface by Mr. F. B. Smith, Secretary for Agriculture.

The publication of so useful a memoir by the Government of the Union of South Africa affords welcome evidence of the enlightened view held by that Government of the value of science and also indicates that they realise fully the need of acquiring an intimate knowledge of the resources of the country by the development and proper application of scientific method.

Attention may be called to the only error we have noticed; *Aizoaceae* on p. 52 should be placed above the genus *Limeum*.

Carex riparia, var. gracilis, in Britain.—In July, 1914, Mr. E. Thurston, C.I.E., who lately presented his fine herbarium of Cornish plants to Kew (see *K.B.*, 1920, p. 44), collected an interesting sedge in the Gunwalloe Valley, Cornwall. After careful investigation it has been concluded that the earliest name applicable to this plant is *Carex riparia*, Curt. var. β *gracilis*, Coss. et Germ., Flore de Paris, 1845, p. 605, where the following description is given: "Tiges presque lisses sur les angles. Feuilles souvent vertes. Épis mâles solitaires ou géminés. Épis femelles laxiflores, longuement pédonculés, souvent pendants. Utricles longuement dépassés par les écailles. Écailles très longuement cuspidées-aristées.—A. R.—Endroits marécageux ombragés.—Corbeil! Mennecey! La cour de France! etc."

The variety is kept up by Husnot, "Cypéracées de France," p. 54 (1905-06), but Rouy et Foucaud, *Fl. de France*, vol. 13, p. 486 (1912) make it a synonym of var. *gracilescens*, Hartm., ap. Anderss., sub-var. *aristata*, Rouy et Fouc. *Carex riparia*, var. *gracilescens*, Hartm., has been considered by some authors the hybrid *C. riparia* \times *vesicaria* (see J. G. Laurell in *Allg. Bot. Zeitschr.* 1900, p. 197). The Cornish plant does not suggest a hybrid nature. Kükenthal (in Engler, *Pflanzenr.*, iv. 20, p. 73) apparently considers the var. *gracilescens*, Hartm. a mixture and, not having seen the still earlier description and name of *gracilis*, Cosson et Germain, he makes the new combination var. *subgracilescens* for what is apparently the same variety.

In the Kew Herbarium a specimen from the Isle of Wight, collected by Dr. Bromfield in a wet salt marsh, at the mouth of the Wootton creek between Ryde and Cowes, in May, 1846, has long peduncles to the female spikes and acuminate glumes longer than the utricles, and must be referred to the var. *gracilis*, Coss. et Germ. It is somewhat abnormal in having androgynous spikes.

Lastly, a plant referred to in the Report for 1915 of the Botanical Society and Exchange Club, p. 379, is the same variety. The following information is there given: "*Carex riparia*, Curt. forma. Tickenham Moor, N. Somerset, v.-c. 6, June 5, 1915. Growing in an open rhine, free from shade."—Miss Ida M. Roper. "Remarkable for its very long lower peduncles and female glumes."—E. S. Marshall. "A curious and interesting

form of *riparia*, exactly analogous to *C. vesicaria*, L., var. *pendula*, Uechtr. Herb. Cf. Asch. & Graeb. in Syn. Mitt. Fl. 212, 190. It may be called f. *pendula*.—A. Bennett." A specimen of this plant has been seen in the private herbarium of Mr. Bruce Jackson, A.L.S. W. B. T.

Forests, Woods and Trees.*—Professor Henry's book appears most opportunely. The depletion of British forests consequent on the demands for timber during the war has created an interest in the subject of forestry more genuine and widespread than has ever existed before. The major part of this book is given up to the consideration of the afforestation of the great water catchment areas of the United Kingdom, owned or controlled by municipalities, and aggregating at the present time nearly one million acres. Although the main purpose of the book is tree-planting regarded from its hygienic aspect, the possibilities of afforestation on so large an area as this is very important from the purely economic standpoint. Existing conditions in regard to ownership of land and timber production in this country make it unlikely that private enterprise alone will do much towards improving the general situation. It is fortunate, therefore, that over one-fifth of the total area of these catchment grounds is owned by public authorities, and encouraging to know that such large Corporations as those of Liverpool, Manchester, Leeds and Birmingham have already found the result of their afforestation schemes to be satisfactory. This subject, although the predominant one in Professor Henry's book, is far from being the only one. The question of the influence of forests on climate is fully discussed, and from the statistics given it would appear that their effects on rainfall are not so great as is generally supposed. Especially is this the case with forests occurring at altitudes of less than 300 ft. With regard to temperature their influence is to reduce the summer heat in the day-time and to keep it higher at night. "Spring and autumn frosts are much less frequent and less disastrous in wooded tracts than in open country." Other chapters deal with the sanitary influence of forests and their value as sites for sanatoria.

A matter of great interest and importance to urban and suburban dwellers is that of trees in parks and in streets. There is a singular lack of enterprise among municipal authorities in regard to this question. An ineradicable conservatism as a rule prevents them from planting any but the most ordinary things, in consequence of which the normal municipal park is extraordinarily dull and commonplace. With such a marvellous choice of beautiful trees and shrubs as is available in these days this ought not to be. But in how many places, for instance, can one find a good collection of magnolias, the most gorgeous flowering trees of northern temperate regions, or of the finest cherries, crabs and such like? The same reluctance to experiment or depart from an ancient order of things is seen also in street planting. The two great defects in the planting of streets as practised nowadays are

* *Forests, Woods and Trees in Relation to Hygiene*. By Augustine Henry, M.A., F.L.S., M.R.I.A. Constable & Co., London, 1919. Price 18s. net.

that the trees selected are naturally too large and too spreading in habit, thus necessitating a ghastly system of pruning; also that they are too thickly planted. Professor Henry recommends a space of 40 ft. between each tree in the lines up each side of the street. This is little enough, but oftener than not street trees are not allotted so much. There are few things more dismal than an overplanted suburban street during a wet spell in late summer or early autumn, the paths transformed into cold damp tunnels of foliage. It is to be hoped that Professor Henry's valuable chapters on these subjects will be read and studied by all those concerned. The book, in fact, is one that has a special claim to the notice of all municipal officials who control the planting of streets, parks and watersheds.

W. J. B.

French Forests and Forestry.*—This work is from the pen of Mr. Theodore S. Woolsey, Jr., lately of the United States Forest Service, and is descriptive of forests and forest conditions existing in the French Colonies, Tunisia, Algeria and Corsica. Each colony is treated separately and details are given of the general economic and social conditions prevailing in the different countries, and the steps that have been taken to secure a system of forest management beneficial to the country and acceptable to the inhabitants. In the early days following the inauguration of a system of forest management which placed considerable restrictions upon the freedom of the people, particularly in the observance of regulations governing the pasturage of cattle, trespass, camping, avoidance of fires, and unlawful removal of timber, friction arose between the French forestry officials and the natives through the French copying too closely the methods of administration prevailing in France. By 1904 the difficulties of management had become so great that Governor Jonnart assembled a commission to study the cause of the dissatisfaction amongst the natives and to prescribe remedies. In his opening address he made use of certain words which appear worthy of consideration, not only in so far as they apply to pioneers in French colonies, but also to other parts of the world. After eulogistic references to the forest officers and their services, he said, "I give them willingly the praise, but I blame them for keeping a little too much apart from the other Algerian service, for applying the regulations too uniformly, and for not having developed the flexibility and the means of adaptation so indispensable to an administrative organization, in a colony where it is unpolitic and often dangerous to try to follow at all times in the footsteps of the fatherland. . . . My desire is that a permanent 'entente cordiale' be established between the Forest Service and the prefects, assistant prefects, and administrators of mixed communes, so that they may work together for the special needs of the popula-

* French Forests and Forestry. Tunisia, Algeria, Corsica. With a Translation of the Algerian Forest Code of 1903. By Theodore S. Woolsey, Jr., M.F., Assistant District Forester, U.S. Forest Service, 1908-1915, Lecturer, 1912, 1916-17, Yale Forest School. New York, John Wiley & Sons, Inc.; London: Chapman & Hall, Limited. 1917.

tion, the preventive measures to be adopted in view of conflagrations, and the fight against the floods. I wish, moreover, that formalities and administrative red tape should not complicate things, as if for the sake of mere convention. I wish finally that the Forest Service should never lose sight of the fact that the surest way to avoid fires is still to interest the natives in the existence of the forests, and to associate them in their conservation, either by showing a greater leniency, so far as the pasturage of their flocks is concerned, or by granting them small individual felling areas. I could cite regions where the natives confined between the lands opened for settlement cannot move, one might say, without risking lawsuits." The deliberations of the commission resulted in several administrative changes which did much to remove vexatious regulations and to reconcile the natives to a curtailment of what they had hitherto regarded as their natural rights. At the same time an educational system was established, whereby they were convinced of the necessity of good methods of forest management for the preservation of the country. The climatic conditions prevailing over a good deal of Tunisia and Algeria are distinctly adverse to the establishment of forests, and the accepted methods of procedure in continental countries have undergone considerable modification in their application to these colonies. Long periods of bright sun, with, in some districts, hot drying winds, prevail, whilst in the wet season there may be torrential storms. The methods adopted by French foresters to overcome the peculiarly trying conditions are worthy of close consideration by planters in other parts of Africa. The most useful economic tree of Tunisia is the Cork Oak (*Quercus Suber*), followed by *Q. Mirbeckii*, and *Pinus halepensis*. The same trees are prominent in Algeria with *Cedrus atlantica* and a few others. In Corsica, *Pinus Laricio*, *P. Pinaster*, *Quercus Ilex*, *Q. Suber*, *Fagus sylvatica*, and *Castanea sativa* are amongst the commonest trees. The metric system of measurement is followed in the book with the equivalent in feet, etc., and here and there errors occur: thus on p. 43 the height of Indian corn is said to be 1.5 metres (7 yards), and on p. 47 the height of Mount Traras is given as 11,359 metres (3727 ft.).

W. D.